TECHNICAL NOTE III

Tobacco taxes in WHO Member States

This report includes appendices containing information on the share of total and excise taxes in the price of the most widely sold brand of cigarettes, based on tax policy information collected from each country. This note contains information on the methodology used by WHO to estimate the share of total and tobacco excise taxes in the price of a pack of 20 cigarettes using country-reported data. It also provides information on additional data collected for this report in relation to tobacco taxation.

1. Data collection

All data were collected between June 2016 and January 2017 by WHO regional data collectors. The two main inputs into calculating the share of total and excise taxes were (1) prices and (2) tax rates and structure. Prices were collected for the most widely sold brand of cigarettes, two other popular brands, the least-expensive brand and the brand Marlboro for July 2016.

Data on tax structure were collected through contacts with ministries of finance. The validity of this information was checked against other sources. These sources, including tax law documents, decrees and official schedules of tax rates and structures and trade information, when available, were either provided by data collectors or were downloaded from ministerial websites or from other United Nations databases such as Comtrade (http://comtrade.un.org/db/). Other secondary data sources were also purchased for data validation.

The tax data collected focus on indirect taxes levied on tobacco products (e.g. excise taxes of various types, import duties, value added taxes, see table below), which usually have the most significant impact on the price of tobacco products. Within indirect taxes, excise taxes are the most important because they are applied exclusively to tobacco, and contribute the most to increasing the price of tobacco products and subsequently reducing consumption. Thus, rates, amounts and point of application of excise taxes are central components of the data collected.

1. Amount-specific excise taxes	An amount-specific excise tax is a tax *on a selected good* produced for sale within a country, or imported and sold in that country. In general, the tax is collected from the manufacturer/wholesaler or at the point of entry into the country by the importer, in addition to import duties. These taxes come in the form of an amount per stick, pack, per 1000 sticks, or per kilogram. Example: US$ 1.50 per pack of 20 cigarettes.
2. Ad valorem excise taxes	An ad valorem excise tax is a tax *on a selected good* produced for sale within a country, or imported and sold in that country. In general, the tax is collected from the manufacturer/wholesaler or at the point of entry into the country by the importer, in addition to import duties. These taxes come in the form of a percentage of the value of a transaction between two independent entities at some point of the production/distribution chain; ad valorem taxes are generally applied to the value of the transactions between the manufacturer and the retailer/wholesaler. Example: 60% of the manufacturer's price.
3. Import duties	An import duty is a tax *on a selected good* imported into a country to be consumed in that country (i.e. the goods are not in transit to another country). In general, import duties are collected from the importer at the point of entry into the country. These taxes can be either amount-specific or ad valorem. Amount-specific import duties are applied in the same way as amount-specific excise taxes. Ad valorem import duties are generally applied to the CIF (cost, insurance, freight) value, i.e. the value of the unloaded consignment that includes the cost of the product itself, insurance and transport and unloading. Example: 50% import duty levied on CIF.
4. Value added taxes and sales taxes	The value added tax (VAT) is a "multi-stage" tax *on all consumer goods and services* applied proportionally to the price the consumer pays for a product. Although manufacturers and wholesalers also participate in the administration and payment of the tax all along the manufacturing/distribution chain, they are all reimbursed through a tax credit system, so that the only entity who pays in the end is the final consumer. Most countries that impose a VAT do so on a base that includes any excise tax and customs duty. Example: VAT representing 10% of the retail price. Some countries, however, impose sales taxes instead. Unlike VAT, sales taxes are levied at the point of retail on the total value of goods and services purchased. For the purposes of the report, care was taken to ensure the VAT and/or sales tax shares were computed in accordance with country-specific rules.
5. Other taxes	Information was also collected on any other tax that is not called an excise tax, import duty, VAT or sales tax, but that applies to either the quantity of tobacco or to the value of a transaction of a tobacco product, with as much detail as possible regarding what is taxed and how the base is defined.

Certain other taxes, in particular direct taxes such as corporate taxes, can potentially impact tobacco prices to the extent that producers pass them on to final consumers. However, because of the practical difficulty of obtaining information on these taxes and the complexity in estimating their potential impact on price in a consistent manner across countries, they are not considered.

	COUNTRY A (US$)	COUNTRY B (US$)
[A] Manufacturer's price (same in both countries)	2.00	2.00
[B] Country A: ad valorem tax on manufacturer's price (20%) = 20% x [A]	0.40	-
[C] Countries A and B: specific excise	2.00	2.00
[D] Retailer's and wholesaler's profit margin (same in both countries)	0.20	0.20
[E] Country B: ad valorem tax on retailer's price (20%) = 20% x ([A]+[C]+[D])	-	0.84
[F] Final price = ***P*** = [A]+[C]+[D]+([B]or[E])	4.60	5.04

2. Data analysis

The price of the most popular brand of cigarettes was considered in the calculation of the tax as a share of the retail price reported in Appendix Table 1.1 and Table 9.1 in online Appendix IX . In the case of countries where different levels of taxes are applied on cigarettes based on length of cigarette, quantity produced, or type (e.g. filter vs. non-filter), only the relevant rate that applied to the most sold brand was used in the calculation.

In the case of Canada and the United States of America, national average estimates calculated for prices and taxes reflect the fact that different rates are applied by each province/state over and above the applicable federal tax. In the case of Brazil, where state VATs vary, an average VAT rate was applied. In India, which also has varying VAT rates across states, the VAT rate applicable to the state where price data was collected (Delhi) was used. Similarly, VAT rates vary in the Federated States of Micronesia and the rate of Pohnpei was used.

The import duty was only used in the calculation of tax shares if the most sold brand of cigarettes was imported into the country. Import duty was not applied in total tax calculation for countries reporting that the most sold brand, even if an international brand, was produced locally.

In cases where the imported cigarettes originated from a country with which a bilateral or multilateral trade agreement waived the duty, care was taken to ensure that the import duty was not taken into account in calculating taxes levied.

"Other taxes" are all other indirect taxes not reported as excise taxes or VAT. These taxes were, however, treated as excises if they had a special rate applied to tobacco products. For example, Thailand reported the tax earmarked from tobacco and alcohol for the ThaiHealth Promotion Foundation as "other tax". However, since this tax is applied only on tobacco and alcohol products, it acts like an excise tax and so was considered an excise in the calculations.

The next step of the exercise was to convert all taxes to the same base – in our case, the tax-inclusive retail sale price (hereafter referred to as P). Standardizing bases is important in calculating tax share correctly, as the example in the table above shows. Country B apparently applies the same ad valorem tax rate (20%) as Country A, but in fact ends up with a higher tax rate and a higher final price because the tax is applied later in the distribution chain.

Comparing reported statutory ad valorem tax rates without taking into account the stage at which the tax is applied could therefore lead to biased results.

A similar methodology was used to calculate the price and tax share of the most common type of smoked (other than cigarettes) and smokeless tobacco products, as reported by each country. The calculation was made for the price of a product for 20 grams for any smoked or smokeless tobacco product except for cigars and cigarillos, for which the price and tax was reported per piece. Price and tax for smoked tobacco products (including bidis, cheroots, cigarillos, cigars, e-cigarettes, pipe tobacco, roll-your-own or waterpipe tobacco) was calculated for 63 countries, while the calculation for smokeless tobacco products (chewing tobacco, dry snuff, moist snuff, nose tobacco or snus) was made for 27 countries (see Table 9.3 in online Appendix IX).

3. Calculation

Denote S_{ts} as the share of taxes on the price of a widely consumed brand of cigarettes (20-cigarette pack or equivalent). Then

$$S_{ts} = S_{as} + S_{av} + S_{id} + S_{VAT} \quad ①$$

Where:

S_{ts} = Total share of taxes in the price of a pack of cigarettes;

S_{as} = Share of amount-specific excise taxes (or equivalent) in the price of a pack of cigarettes;

S_{av} = Share of ad valorem excise taxes (or equivalent) in the price of a pack of cigarettes;

S_{id} = Share of import duties in the price of a pack of cigarettes (if the most popular brand is imported);

S_{VAT} = Share of the value added tax in the price of a pack of cigarettes.

Calculating S_{as} is fairly straightforward and involves dividing the specific tax amount for a 20-cigarette pack by the total price. Unlike S_{as}, the share of ad valorem taxes, S_{av} is much more difficult to calculate and involves making some assumptions described below. Import duties are sometimes amount-specific, sometimes value-based. S_{id} is therefore calculated the same way as S_{as} if it is amount-specific and the same way as S_{av} if it is value-based. VAT rates reported for countries are usually applied on the VAT-exclusive retail sale price but are also sometimes reported on VAT-inclusive prices. S_{VAT} is calculated to consistently reflect the share of the VAT in VAT-inclusive retail sale price.

The price of a pack of cigarettes can be expressed as the following:[1]

$$P = [(M + M \times ID) + (M + M \times ID) \times T_{av}\% + T_{as} + \pi] \times (1 + VAT\%)$$

or

$$P = [M \times (1 \times ID) \times (1 + T_{av}\%) + T_{as} + \pi] \times (1 + VAT\%) \quad ②$$

Where:

P = Price per pack of 20 cigarettes of the most popular brand consumed locally;

M = Manufacturer's/distributor's price, or import price if the brand is imported;

ID = Import duty rate (where applicable) on a pack of 20 cigarettes;[2]

T_{av} = Statutory rate of ad valorem tax;

T_{as} = Amount-specific excise tax on a pack of 20 cigarettes;

π = Retailer's, wholesaler's and importer's profit per pack of 20 cigarettes (sometimes expressed as a mark-up);

VAT = Statutory rate of value added tax on VAT-exclusive price.

Changes to this formula were made based on country-specific considerations such as the base for the ad valorem tax and excise tax, the existence – or not – of ad valorem and specific excise taxes, and whether the most popular brand was locally produced or imported. In many cases (particularly in low- and middle-income countries) the base for ad valorem excise tax was the manufacturer's/distributor's price.

Given knowledge of price (P) and amount-specific excise tax (T_{as}), the share S_{as} is easy to recover ($=T_{as}/P$). The case of ad valorem taxes (and, where applicable, S_{id}) is fairly straightforward when, by law, the base is retail price (as is the case in several European Union countries). The calculation is more complicated when the base is the retail price, because the base (M) needs to be recovered in order to calculate the amount of ad valorem tax. In most of the cases M was not known (unless specifically reported by the country), and therefore had to be estimated.

Using equation (2), it is possible to recover M:

$$M = \frac{\frac{P}{1 + VAT\%} - \pi - T_{as}}{(1 + T_{av}\%) \times (1 + ID)} \quad ③$$

π, or wholesalers' and retailers' profit margins, are rarely publicly disclosed and will vary from country to country. For domestically produced most popular brands, we considered π to be nil (i.e. =0) in the calculation of M because the retailer's and wholesaler's margins are assumed to be small. Setting the margin to 0, however, would result in an overestimation of M and therefore of the base for the ad valorem tax. This will in turn result in an overestimation of the amount of ad valorem tax. Since the goal of this exercise is to measure how high the share of tobacco taxes is in the price of a typical pack of cigarettes, assuming that the retailer's/wholesaler's profit (π) is nil, therefore, does not penalize countries by underestimating their ad valorem taxes. In light of this it was decided that unless and until country-specific information was made available to WHO, the retailer's or wholesaler's margin would be assumed to be nil for domestically produced brands.

For countries where the most popular brand is imported, the import duty is applied on CIF values, and the consequent excise taxes are typically applied on a base that includes the CIF value and the import duty, but not the importer's profit. For domestically produced cigarettes, the producer's price includes its own profit so it is automatically included in M. In practice, however, the importer's profit can be relatively significant and setting it to zero (as in the case of domestically manufactured cigarettes) would substantially overestimate M, and thereby overestimate the share of ad valorem tax in final price. For this reason, M had to be estimated differently for imported products: M* (or the CIF value) was calculated either based on information reported by countries or using secondary sources (data from the United Nations Comtrade database). M* was normally calculated as the import price of cigarettes in a country (value of cigarette imports divided by the quantity of cigarette imports for the importing country). In cases where import data was unavailable or implied a very small CIF value (Equatorial Guinea, Iraq, Libya, Niue and Turkmenistan), the value of cigarette exports, FOB[3] from the rest of the world to the country divided by the volume of those exports was used.

In all instances, the estimate was compared to corresponding calculations made for the 2015 edition of this report to check for large deviations from the 2014 estimate. Import (or partners' export) values used in this way were typically obtained as US$ values for 2015; the CIF value so estimated was converted to 2016 domestic prices using the 2016 exchange rate. In some countries where the 2014 CIF value had been more reliably estimated, but the 2015 data were not available, the 2014 estimate was either used as such (when final price was unchanged), or was extrapolated when final product prices had risen (a proportionate increase of the 2014 CIF estimate in the case of the Democratic Republic of Congo, and a linear estimate based on data from 2008 through 2014 in the case of Afghanistan).

The ad valorem and other taxes were then calculated in the same way as for local cigarettes, using M* rather than M as the base, where applicable.

In the case of VAT, in most of the cases the base was P excluding the VAT (or, similarly, the manufacturer's/distributor's price plus all excise taxes). In other words:

$$S_{VAT} = VAT\% \times (1 - S_{VAT}), \text{ equivalent to} \quad ④$$
$$S_{VAT} = VAT\% \div (1 + VAT\%)$$

So in sum, the tax rates are calculated this way:

$$S_{ts} = S_{id} + S_{as} + S_{av} + S_{VAT} \quad ⑤$$

$$S_{as} = T_{as} \div P$$

$$S_{av} = (T_{av}\% \times M) \div P$$

or

$$(T_{av}\% \times M^* \times (1 + S_{id})) \div P$$

if the most popular brand was imported [4]

$$S_{id} = (T_{ID}\% \times M^*) \div P$$

(if the import duty is value-based)

or

$$ID \div P$$

(if import duty is a specific amount per pack)

$$S_{VAT} = VAT\% \div (1 + VAT\%)$$

4. Prices

Primary collection of price data in this and previous reports involved surveying retail outlets. In order to improve the quality of the prices collected this year, similar to 2014, price data was collected in the following manner:

- In addition to the most sold brand reported in previous years, prices of two additional popular brands were requested.[5]
- For each brand, prices were required from three different types of retail outlets.

Questionnaires sent to data collectors were pre-populated with the names of the three highest selling brands in each country. The three popular brands were identified using data collected from the 2014 questionnaires, from secondary data (Euromonitor[6]) and through WHO's close collaboration with ministries of finance. For the countries where such data were not available, data collectors were asked to indicate the names of the popular brands and provide their prices.

The three types of retail outlets were defined as follows:

1. Supermarket/hypermarket: chain or independent retail outlets with a selling space of over 2500 square metres and a primary focus on selling food/beverages/tobacco and other groceries. Hypermarkets also sell a range of non-grocery merchandise.
2. Kiosk/newsagent/tobacconist/independent food store: small convenience stores, retail outlets selling predominantly food, beverages and tobacco or a combination of these (e.g. kiosk, newsagent or tobacconist) or a wide range of predominantly grocery products (independent food stores or independent small grocers).
3. Street vendors: sell goods in small amounts to consumers but not from a fixed location (not applicable to all countries).

Most sold brands have been used consistently over time to gain a better reflection of the change in prices. However, in some cases where the market share of the brand initially used was considered to have changed substantially, a change was made to the new, more prevalent brand. In 2016, changes in the brand were made for Bolivia (Plurinational State of), China, Cook Islands, Czechia, Gambia, Hungary, Kyrgyzstan, Libya, Micronesia (Federated States of), Montenegro, Rwanda, Swaziland, Turkey, Turkmenistan, Tuvalu and Viet Nam. In all these countries the price of the new brand was higher, except in Libya and Rwanda (lower prices) and China (different brand, identical price as 2014). In 11 other countries (Belize, Cameroon, Chad, Democratic Republic of the Congo, Kiribati, Namibia, Panama, Philippines, Portugal, Slovenia, United Kingdom), the brand reported in 2016 was determined to be either a variant or a parent brand of the brand reported in 2014, and these were treated as identical in both years for purposes of price comparisons.

As in 2012 and 2014, the price used for each of the 28 countries of the European union (EU) was the most sold brand price collected by WHO. Prior to 2012, price and tax information were taken entirely from the EU's Taxation and Customs union website for the current report.[7] The price used by the EU in the past to calculate tax rates was the most popular price category (MPPC), which was assumed to be similar to the most sold brand price category collected in this report. However, since 2011, the EU calculates and reports tax rates based on the Weighted Average Price (WAP) and therefore information on the MPPC is no longer readily available for EU countries. Consequently, in order to be consistent with past years' estimates and to ensure comparability with other countries, WHO decided in 2012 to collect first-hand the prices of the most sold brand (the brand was determined based on brand market shares reported from secondary sources) to calculate tax rates. Excise and VAT rates are still collected from the EU published tables. This means, however, that tax shares as computed and reported in this report will not necessarily be similar to the rates published by the EU. This is mainly due to the calculation of the specific excise tax rates as a percentage of the retail price, which will vary depending on the price used. See details of the difference in price and tax share for the EU countries in the table below.

Comparisons of prices and total tax shares computed from WHO's most sold brand (MSB) survey and EU weighted average price (WAP), July 2016

	Total tax share (% of retail price)		Retail price (20 cigarettes)		
Country	WHO estimates	EU reported rates	WHO reported MSB	EU reported WAP	Currency
Austria	75.67%	77.79%	5.00	4.48	EUR
Belgium	75.71%	77.53%	6.32	5.51	EUR
Bulgaria	83.24%	84.20%	2.51	2.42	BGN
Croatia	77.17%	78.09%	3.14	3.00	HRK
Cyprus	77.55%	76.09%	4.20	4.21	EUR
Czechia	77.46%	79.05%	3.09	2.95	CZK
Denmark	74.75%	78.90%	5.90	5.47	DKK
Estonia	77.20%	84.45%	3.80	3.07	EUR
Finland	84.91%	85.98%	6.12	5.68	EUR
France	80.30%	80.82%	7.00	6.75	EUR
Germany	70.39%	74.44%	6.00	5.34	EUR
Greece	80.60%	83.85%	4.00	3.71	EUR
Hungary	73.52%	75.93%	3.68	3.38	HUF
Ireland	78.26%	84.09%	10.80	9.68	EUR
Italy	75.94%	76.73%	5.20	4.66	EUR
Latvia	79.83%	81.26%	3.00	2.89	EUR
Lithuania	75.06%	78.95%	3.10	2.77	EUR
Luxembourg	70.72%	69.61%	5.20	4.50	EUR
Malta	77.99%	80.92%	5.30	4.92	EUR
Netherlands	72.20%	78.51%	6.63	6.05	EUR
Poland	78.24%	81.21%	3.46	3.13	PLN
Portugal	73.55%	78.05%	4.80	4.29	EUR
Romania	71.83%	76.13%	3.62	3.28	RON
Slovakia	78.06%	79.30%	3.10	3.06	EUR
Slovenia	78.54%	78.43%	3.50	3.51	EUR
Spain	78.29%	78.82%	4.85	4.44	EUR
Sweden	68.50%	78.22%	6.74	5.59	SEK
United Kingdom	80.50%	83.99%	11.27	10.49	GBP

Note: WHO estimates pertain to most sold brand prices collected in July 2016. EU reported rates and weighted average prices pertain to data collected by the EU, and are also reported for July 2016.

5. Considerations in interpreting tax share changes

Changes in tax as a share of price are not only dependent on tax changes but also on price changes. Therefore, despite an increase in tax, the tax share could remain the same or go down; similarly, sometimes a tax share can increase even if there is no change or an increase in the tax.

In the current database, there are cases where taxes increased between 2014 and 2016 but the share of tax as a percentage of the price went down. This is mainly due to the fact that, in absolute terms, the price increase was larger than the tax increase (particularly in the case of specific excise tax increases). For example, in Seychelles, the specific excise tax increased from 500 SCR per 200 cigarettes in 2014 to 606 SCR per 200 cigarettes in 2016 (a 21% increase) while the price of the most sold brand increased from 75 to 105 SCR per pack (a 40% increase). In terms of tax share, the excise represented 67% of the price in 2014 while it represented 58% of the price in 2016. This is because prices rose more than taxes.

Similarly, there are cases where increases (decreases) in tax as a share of price were mitigated by factors not directly related to tax rates. In the current database, this was attributable to one or more of the following reasons:

- In some instances, the price increased without a tax change, leading to a decrease in the tax share for a specific or mixed excise structure (e.g. Bahamas, Barbados, Japan, Kiribati , Mauritius, Mexico, Slovakia, Spain, Switzerland, Timor-Leste, and Yemen)
- In other cases, prices increased above tax increases, leading to a decrease in tax share (e.g. Belgium, Botswana, Canada, Costa Rica, Democratic Republic of the Congo, Estonia, Fiji, Germany, Honduras, Hungary, Iceland, Jordan, Malaysia, Montenegro, Nepal, Netherlands, New Zealand, Norway, Pakistan, Philippines, Poland, Portugal, Romania, Samoa, Serbia, Seychelles, Slovenia, Sri Lanka, Sweden, The former Yugoslav Republic of Macedonia, Ukraine, United Kingdom, Uruguay and Zimbabwe)
- In other cases, a newly introduced tax was accompanied by a larger price increase, so that the total share of taxes in price fell (Algeria and Myanmar)
- In the case of imported products, the CIF value is an external variable that also influences the calculation of tax share. This has implications in countries where ad valorem tax is based on the CIF value, when import duties are applicable on the CIF value or when the VAT is calculated on the base of CIF value + excise rather than VAT exclusive retail price. For example, if the CIF value increases, the base for the application of the tax is higher, leading to a higher tax percentage if nothing else changes.
- Additionally, as indicated above, for some countries, CIF values had to be estimated using secondary data. Those values are provided in US$ and converted to the local currency, making the exchange rate an additional factor indirectly influencing tax shares. Some examples of countries where these factors influence tax share include: Benin (decrease in reported CIF value combined with no change in retail price, leading to a reduction in overall tax share); Antigua and Barbuda, Cameroon (higher CIF value reported in 2016, resulting in an increase in share of CIF value and tax without rates changing), Equatorial Guinea (local currency appreciated relative to US$, but CIF value increased more, so that overall CIF value and share in price was higher) and Liberia (CIF value reported fell in US$ terms but local currency depreciated more, so that CIF value rose in local currency).

Care should also be taken in relation to countries where the most sold brand changed between 2014 and 2016. This has also had an impact on the tax proportion of the affected countries. When taxes are increased, and the new brand reported is more expensive, the two possibilities are: total tax share increases (Cook Islands, Czechia, Kyrgyzstan, Turkey and Viet Nam), or the total tax share decreases (Hungary). In the case of Bolivia (Plurinational State of), the tax proportion decreased despite no tax change, because of the apparent increase in prices due to the new, more expensive brand reported as the most sold brand.

Finally, when new, improved information was provided in terms of taxation and prices for some countries, corrections were made in the calculations of tax rates for 2008, 2010, 2012 and 2014 estimates, as needed.

6. Supplementary tax information (see Table 9.5, online Appendix XII)

An important consideration highlighted in this report is that many aspects of tobacco taxation need to be taken into account in order to assess if a tax policy is well designed. Tax as a proportion of price does not tell the whole story about the effectiveness of a tax policy. To explore other dimensions of tax policy, the current report collected additional information in relation to tobacco taxation and compiled it into data that can inform researchers and policy-makers further on tax policy in different countries.

The information was compiled and classified according to three main themes: tax structure/level; affordability and price dispersion; and tax administration. Information was also collected in relation to countries that earmark tobacco taxes to fund health programmes and/or tobacco control activities..

I. Tax structure/level

a. Excise tax proportion of price: higher tax rates and greater reliance on excise is better, particularly when the excise tax is ≥70% of retail price.
b. Uniform vs. tiered excise tax system: a uniform excise is easier to administer than a tiered system where variable rates apply based on selected criteria within one tobacco product (not applicable in countries where no excise tax is implemented).
c. Whether a country applies a specific excise or a mixed system relying more on the specific tax component (>50% of total excise is specific): specific excises typically lead to higher prices and a smaller price gap between different brands, so is preferred (not applicable in countries where only ad valorem excise is applicable or where no excise tax is implemented).
d. Base of the ad valorem tax in countries that apply an ad valorem or a mixed excise system. Ad valorem taxes applied to the retail price or the retail price excluding VAT are administratively simpler. The retail price is easier to determine than producer price or CIF value, and therefore there is less risk of undervaluation (not applicable in countries where only specific excise is applicable, or where no excise tax is implemented).
e. If the excise applied is ad valorem or if it is mixed, and whether there is a minimum specific tax. A minimum tax provides protection against products being undervalued. It also forces prices up since the price will not be lower than the tax paid (this category does not apply to countries where only specific excise tax is applicable or where no excise tax is implemented).

II. Affordability and price dispersion

a. Affordability index (% of GDP per capita to buy 100 packs of cigarettes of the most sold brand): across countries, a higher value indicates cigarettes are relatively more expensive in relation to income.

b. Whether cigarettes have become relatively more affordable between 2008 and 2016 (change in the affordability index as measured above, between 2008 and 2016): as affordability decreases, consumption is discouraged.

c. If the excise tax applied is specific or if it is mixed, and whether the specific tax component is automatically adjusted for inflation. If the specific tax is not adjusted for inflation over time, its impact will be eroded. It is good to have it adjusted automatically (this category does not apply to countries where only ad valorem excise tax is applicable or where no excise tax is implemented).

d. Price dispersion: share of cheapest brand price in premium brand price (cheapest brand price ÷ premium brand price × 100). The higher the proportion, the smaller the gap and the fewer are the opportunities for substitution to cheaper brands.

III. Tax administration

a. Requirement of tax stamps on tobacco products: tax stamps help administrators ensure that producers and importers comply with tax payment requirements, and help detect illicit tobacco products. A note was made of countries requiring tax stamps to bear special features beyond those found on traditional paper stamps. Specifically, these are encrypted tax stamps that include unique, machine-readable identification markings and can be used to track production in the country through monitoring devices installed in manufacturing facilities that scan the digital stamp, and are also used to detect the presence of illicit products. The devices register a wealth of information that is automatically sent to tax administrators and is useful for tracking and tracing and enforcement work. Similar stamps are also applied on imported products. This is considered best practice for monitoring the market.

b. Duty free imports: banning duty-free imports for personal consumption reduces the chance that these products end up in the illicit market. Additionally, there is no justification for selling a deadly product duty-free; those foregone taxes are a revenue loss for the government. While a few countries ban duty free imports outright, many countries permit them, but limit the quantity that travellers are allowed to bring in. These restrictions can vary by tobacco products; the data reported only refers to limits on cigarette quantities.

IV. Earmarking (portion of taxes or revenues from taxes dedicated to health and/or tobacco control). Taxes can generate substantial revenues. One way of correcting for the negative externality of tobacco use would be to increase taxes to reduce consumption and fund health care, which is often underfunded and put under additional strain because of tobacco use (see Table 9.4 in online Appendix IX).

7. Estimates of the affordability of cigarettes (see Table 9.6, online Appendix IX)

The affordability of cigarettes for each of the years 2008, 2010, 2012, 2014 and 2016 was measured by the per capita GDP required to purchase 2000 cigarettes of the most sold brand reported in that year.

Estimates of GDP per capita in local currency units were sourced from the IMF's World Economic Outlook (WEO) database which provides a complete series of estimates for most of the 195 countries reported on. Where GDP per capita data were not available in the WEO database, (Andorra, Cuba, Liberia, Somalia, Timor-Leste and West Bank and Gaza Strip), the World Bank's GDP per capita data series was used. In the case of the Cook Islands, UN data was sourced and converted into the local currency. For each country-year pair, the currency reported for the most sold brand was tallied with the corresponding currency for the GDP series, and exchange rate conversions and adjustments were performed as needed (Cambodia, Estonia, Latvia, Lithuania, Turkmenistan and Zambia) to align the two data series.

To assess whether affordability changed on average since 2008, the average annual percentage change in affordability was calculated as the least squares growth rate for all countries with three or more years of data, including data for 2016. This criterion automatically excluded countries where World Bank GDP per capita estimates were used, given that the series ended with the year 2015 at the time the analysis was performed.

The affordability of cigarettes was judged to have been unchanged if the least squares trend in the per capita GDP required to purchase 2000 cigarettes (that is, 100 packs of 20 cigarettes) was not significant at the 5% level. Cigarettes were judged to have become less (more) affordable on average if the least squares trend in the per capita GDP required to purchase 2000 cigarettes was positive (negative) and significantly different from zero at the 5% level.

[1] This formula applies when the ad valorem tax is applied on the manufacturer's/distributor's price, the import duty is applied on the manufacturer's/distributor's price of the CIF value and the VAT is applied on the VAT-exclusive retail price. Other scenarios exist (e.g. ad valorem rate applies on the retail price) but they are not described here because they are usually more straightforward to calculate.

[2] Import duties may vary depending on the country of origin in cases of preferential trade agreements. WHO tried to determine the origin of the pack and relevance of using such rates where possible.

[3] "Free On Board" or "Freight On Board": value of a product at export.

[4] Or (T_{av} % × M*) ÷ P, if the ad valorem tax was applied only on the CIF value, not the CIF value + the import duty.

[5] The brands are used for internal purposes for data validation and are not published in the report.

[6] Euromonitor International's Passport, 2016.

[7] See http://ec.europa.eu/taxation_customs/taxation/excise_duties/tobacco_products/rates/index_en.htm.